CLAIMS

1. Microporous manufacts with apparent density of 0.001 - 0.8 g/cm^3 and nanoporous based on syndiotactic polystyrene in the δ crystalline form with a percentage of crystallinity between 5-70%, obtainable according the process comprising the following steps:

a) preparation of a gel based on syndiotactic homopolymer or copolymers of styrene, at a polymer concentration between 0.1 and 50 wt% in a solvent or a mixture of solvents, one of which being a suitable guest of a syndiotactic polystyrene clathrate phase, wherein the copolymers contain as comonomers CH_2=CH-R olefins, wherein R is an alkyl-aryl or a substituted-aryl radical with 6-20 carbon atoms.

b) removal of the solvent from the gel by liquid or supercritical carbon dioxide extraction process, operating at pressures between 50 and 350 bar and temperature between 20 and 70°C.

2. Manufacts according to claim 1, wherein the homopolymer or copolymer concentration in the gel is in the range 0,5 - 30 wt%.

3. Manufacts according to anyone of claims 1 and 2, wherein the gel can be a physical gel or a chemical gel wherein the fraction of comonomer units derived from the at least bi-functional monomers used as cross-linking agents is between 20 and 0.1 mol%, preferably below 10 mol%.

4. Process for preparing microporous and nanopous manufacts based on syndiotactic polystyrene being in the δ crystalline form, comprising the following steps:

a) preparation of a gel based on homopolymers or copolymers of syndiotactic polystyrene, at a polymer concentration between 0.1 and 50 wt% in a solvent or a mixture of solvents, at least one of said solvents being a suitable guest of a clathrate phase of syndiotactic polystyrene, wherein the copolymers contain as comonomeric units CH_2=CH-R olefins, where R is an alkyl-

aryl or a substituted-aryl radical with 6-20 carbon atoms.

b) Removal of the solvent from the gel by liquid or supercritical carbon dioxide extraction process, operating at pressures between 50 and 350 bar and temperature between 20 and 70°C.

5. Process according to claim 4 wherein in said step a) the homopolymer or copolymer concentration in the gel is in the range 0.5-30 wt%.

6. Process according to anyone of claims 4 and 5 wherein said gel can be a physical gel or a chemical gel wherein the fraction of comonomer units derived from the at least bi-functional monomers used as cross linking agents is between 20 and 0.1 mol%, and preferably below 10 mol%.

7. Process according to claims 4 to 6 wherein in said step a) said gel based on homopolymers or copolymers of syndiotactic polystyrene is prepared in situ through the polymerization of styrene which acts both as monomer and solvent of the reaction.

8. Use of the manufacts as claimed in claims 1 to 3 as sorbing elements with a fast kinetics of sorption of volatile organic compounds, alone or when present in liquid or gaseous mixtures.

9. Devices and, or sensors for the detection of organic volatile compounds which contain manufacts as claimed in claims 1 to 3.